



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/995,179      | 11/27/2001  | Bhiksha Raj          |                     | 5430             |

7590

01/14/2005

Patent Department  
Mitsubishi Electric Research Laboratories, Inc.  
201 Broadway  
Cambridge, MA 02139

|          |
|----------|
| EXAMINER |
|----------|

VO, HUYEN X

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2655

DATE MAILED: 01/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/995,179

Applicant(s)

RAJ ET AL.

Examiner

Huyen Vo

Art Unit

2655

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the feature upon which the applicant relies (i.e., dimensionality reduction can be performed using LDA or neural network) is not recited in the rejected claims. Although the claims are interpreted in the light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The phrase "discriminatively combining" cited in the rejected claims is broad enough for the prior art reference to read on. In this case, the examiner interprets that "discriminatively combining" is the step of generating speech recognition features by using the residual signal and LPC parameters, which (*col. 8, lines 1-53 and/or referring to figure 9, particularly, where  $dr'$  is the residual signal and  $LARcr$  (calculated from the LPC)*).

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless – (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by HersHKovits et al. (US Patent No. 6003004).

Art Unit: 2655

4. Regarding claim 1, Hershkovits et al. disclose a method for extracting speech recognition features from a speech signal coded as a bitstream, comprising: decoding the bitstream to recover linear predictive coding filter parameters (*col. 6, ln. 3-18 or referring to figure 9*); decoding the bitstream to recover a residual signal (*col. 7, ln. 56 to col. 8, ln. 29*); and discriminatively combining the linear predictive coding filter parameters and the residual signal into speech recognition features (*col. 8, lines 1-53 and/or referring to figure 9, particularly, where  $dr'$  is the residual signal and  $LARcr$* ).

5. Regarding claim 6, Hershkovits et al. further disclose a method of claim 1 further comprising: analyzing an entire spectrum of the residual signal (*col. 4, ln. 35-67, processing and analyzing the entire frame*).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkovits et al. (US Patent No. 6003004) in view of Aguilar et al. (US Patent No. 6691082).

Art Unit: 2655

8. Regarding claim 2, Hershkovits et al. do not disclose the method of claim 1 further comprising: up-sampling the linear predictive coding parameters, and interpolating the up-sampled linear predictive coding parameters. However, Aguilar et al. teach the steps of up-sampling the linear predictive coding parameters (*col. 14, ln. 1-27*), and interpolating the up-sampled linear predictive coding parameters (*col. 14, ln. 1-27*).

Since Hershkovits et al. and Aguilar et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Hershkovits et al. by incorporating the teaching of Aguilar et al. in order to perceptual quality of the output signal.

9. Regarding claims 3-4, Hershkovits et al. further disclose that the method of claim 2 wherein a set of samples is obtained for every frame of the bitstream (*col. 5, ln. 23-25*), and the step of deriving cepstral vectors from the up-sampled LPC filter parameters (*col. 6, ln. 1-18*).

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkovits et al. (US Patent No. 6003004) in view of Park (US Patent No. 6108624).

11. Regarding claim 5, Hershkovits et al. further disclose the method of claim 1 further comprising: decoding the bitstream to obtain the residual signal (*output dr' of block 84 in figure 9*). Hershkovits et al. fail to disclose the step of setting short-term

Art Unit: 2655

prediction coefficients to zero. However, Park teaches the step of setting short-term prediction coefficients to zero (*col. 6, ln. 1-13*).

Since Hershkovits et al. and Park are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Hershkovits et al. by incorporating the teaching of Park in order to obtain optimum values of residual signal.

12. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkovits et al. (US Patent No. 6003004) in view of applicant's admitted prior art.

13. Regarding claim 7, Hershkovits et al. do not disclose the method of claim 1 further comprising: deriving a high-dimensional log spectra from the residual signal for each set of up-sampled LPC filter parameters. However, applicant's admitted prior art teaches the step of deriving a high-dimensional log spectra from the residual signal for each set of up-sampled LPC filter parameters (*page 11, residual log-spectra must be derived before inputted into the neural network*).

Since Hershkovits et al. and applicant's admitted prior art are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Hershkovits et al. by incorporating the teaching of applicant's admitted prior art in order to construct speech recognition features to enhance recognition accuracy.

Art Unit: 2655

14. Claim 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkovits et al. (US Patent No. 6003004) in view of applicant's admitted prior art, and further in view of Kuhn et al. (US Patent No. 6343267).

1. Regarding claim 8, Hershkovits et al. further disclose the method of claim 1 further comprising: deriving a cepstral vector corresponding to each set of linear predicative of each frame (*col. 5, ln. 26 to col. 6, ln. 29*), but do not disclose the steps of deriving a high-dimensional log spectra from the residual signal for each frame, and concatenating the cepstral vector with each corresponding high-dimensional log spectra for each frame to generated an extended vector. However, applicant's admitted prior art teaches the step of deriving a high-dimensional log spectra from the residual signal for each frame (*page 11*).

Since Hershkovits et al. and applicant's admitted prior art are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Hershkovits et al. by incorporating the teaching of applicant's admitted prior art in order to construct speech recognition features to enhance recognition accuracy.

The modified Hershkovits et al. still do not disclose the step of concatenating the cepstral vector with each corresponding high-dimensional log spectra for each frame to generated an extended vector. However, Kuhn et al. teach the step of concatenating the cepstral vector with each corresponding high-dimensional log spectra for each frame to generated an extended vector (*col. 9, ln. 14-30*).

Since Hershkovits et al. and Kuhn et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Hershkovits et al. by incorporating the teaching of Kuhn et al. in order to train the system of new speakers using the system.

15. Regarding claims 9-10, the modified Hershkovits et al. fail to disclose the method of claim 8 further comprising: reducing a dimensionality of the extended vector using linear discriminant analysis, and discriminant neural network. However, applicant's admitted prior art further teaches the steps of reducing a dimensionality of the extended vector using linear discriminant analysis, and discriminant neural network (*pages 10-11*).

Since Hershkovits et al. and Kuhn et al. are analogous art because they are from the same field of endeavors, it would have been obvious to one of ordinary skill in the art at the time of invention to further modify Hershkovits et al. by incorporating the teaching of Kuhn et al. in order to reduce storing memory and processing time.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hershkovits et al. (US Patent No. 6003004).

17. Regarding claim 11, Hershkovits et al. fail to specifically disclose the method of claim 1 wherein the speech recognition features are extracted from a bitstream in a server executing a speech recognizer. However, the examiner takes official notice that



speech recognition features extraction at the server having speech recognition capability is well known in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Hershkovits et al. by incorporating the step of extracting speech features at the speech recognition server in order to make the speech recognition more robust and at the same time preserve processing power for the client device to operate longer.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Huyen Vo whose telephone number is 703-305-8665. The examiner can normally be reached on M-F, 9-5:30.

Art Unit: 2655


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Doris To can be reached on 703-305-4827. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner Huyen X. Vo

January 11, 2005

\*\*\*

  
**SUSAN MCFADDEN**  
**PRIMARY EXAMINER**